EUB

Emergency Preparedness and Response Requirements For the Upstream Petroleum Industry

June 2003

Alberta Energy and Utilities Board

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ALBERTA ENERGY AND UTILITIES BOARD
Guide 71: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry

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1 Introduction

This guide provides the minimum Alberta Energy and Utilities Board (EUB) emergency preparedness and response requirements for the upstream petroleum industry and adopts the current edition of CSA Standard CAN/CSA Z-731. It is the responsibility of the licensee (including approval and permit holders) to determine when an emergency response plan (ERP) is required and the type of plan required. The guide details common emergency preparedness and response requirements that apply to any hazard related to upstream petroleum operations and sets out additional requirements specific to sour wells, sour production facilities and associated gathering systems, high vapour pressure (HVP) pipelines, spills of hydrocarbons and produced water, and hydrocarbon storage in caverns. This guide replaces all EUB documents listed in Appendix 1.

1.1 Purpose of an ERP

A key component of emergency preparedness and response is the development of an ERP, which is defined as a document developed to ensure quick access to critical information necessary to effectively respond to an emergency. A schematic illustrating the ERP development process is shown in Figure 1. The extent of the information contained within the plan is determined by the potential hazard(s) identified.

The purpose of an ERP is to ensure a quick, effective response to emergencies in order to protect the public from fatalities and irreversible health effects. An ERP addresses worst-case emergency scenarios, potential hazards to the public, and systems required for adequate response.

A comprehensive ERP

- must be well organized to ensure quick access to critical information;
- coordinates activities among industry responders, emergency services, local authorities, governments, and others who have a role in providing an effective response;
- ensures communication with all parties involved in or potentially affected by the emergency;
- assists personnel in determining and performing remedial actions;
- clearly establishes roles and responsibilities of all responders;
- identifies response organizations and command control structures;
- identifies predetermined resources, required personnel, equipment, and services; and
- increases public confidence in the ability of industry to handle emergencies.

1.2 What's New in *Guide 71*

This guide is a consolidation of current emergency preparedness and response requirements found in EUB interim directives (IDs) and informational letters (ILs) and accepted emergency response practices used by industry and the EUB. The new requirements found in this guide are summarized in Appendix 2. Definitions and abbreviations used in the guide are listed in Appendix 3.

1.3 How to Use This Guide

The main sections of *Guide 71* are as follows:

- Section 2: Initial Planning Requirements for Specific ERPs describes the methodology used for determining the initial size of an emergency planning zone

(EPZ). Notification and consultation requirements for public and local government involvement are also defined in this section.

- Section 3: Corporate Level ERPs describes the requirements for corporate-level plans, including use of the criteria matrix for classifying incidents, communications plan, personnel responsibilities, and response management centres.
- Section 4: Sour Gas and Sour Multiphase ERPs outlines the minimum required content for different types of specific sour gas and sour multiphase ERPs and the circumstances when each type of plan is acceptable.
- Section 5: High Vapour Pressure (HVP) Pipeline ERP Requirements outlines the current ERP requirements for HVP pipelines.
- Section 6: ERP Requirements for Hydrocarbon Storage in Caverns details the current ERP requirements for hydrocarbon storage in caverns.
- Section 7: Spill Response Contingency Plans deals with contingency plan content and spill training exercise and notification requirements. Enforcement actions for noncompliance to these requirements are also discussed in this section.

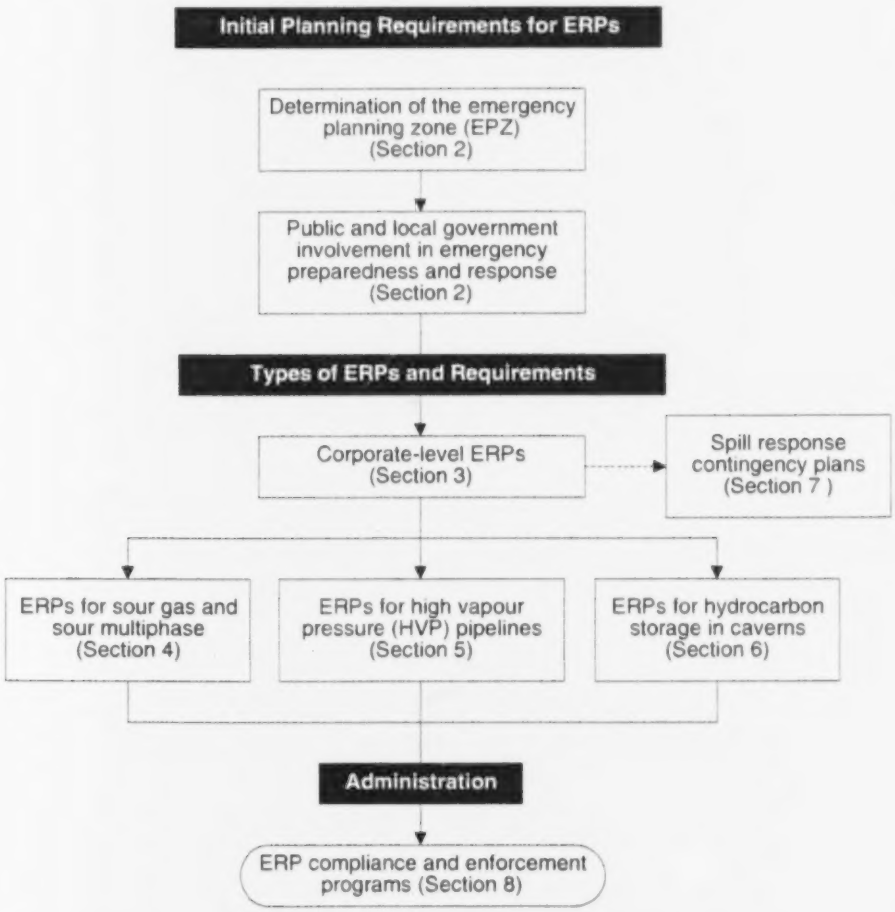
Initial Planning Requirements for ERPs
Determination of the emergency planning zone (EPZ) (Section 2)
Public and local government involvement in emergency preparedness and response (Section 2)
Types of ERPs and Requirements
Corporate-level ERPs (Section 3)
Spill response contingency plans (Section 7)
ERPs for sour gas and sour multiphase (Section 4)
ERPs for high vapour pressure (HVP) pipelines (Section 5)
ERPs for hydrocarbon storage in caverns (Section 6)
Administration
ERP compliance and enforcement programs (Section 8)

Figure 1. Emergency preparedness and response program flowchart

- Section 8: ERP Enforcement and Compliance Programs provides an overview of the EUB process that is currently in place and the process under development that will ensure compliance with the requirements of this guide.

1.4 Regulatory Requirements for ERPs

1.4.1 Corporate-Level ERPs

In accordance with Sections 8.002(1) and 8.002(2) of the Oil and Gas Conservation Regulations (OGCR) and Sections 50.1(1) and 50.1(2) of the Pipeline Regulation pursuant to the Pipeline Act, the EUB requires all licensees to have, as a minimum, a corporate-level ERP. Corporate-level ERPs do not require EUB approval but must be submitted for review upon request.

1.4.2 Specific ERPs for Sour Wells

In accordance with Sections 8.003(1) and 8.003(2) of the OGCR, a licensee must prepare a specific ERP for all sour wells requiring a plan and submit the ERP to the EUB for approval.

1.4.3 Specific ERPs for Sour Production Facilities

In accordance with Sections 8.004(1) and 8.004(2) of the OGCR and Sections 50.2(1) and 50.2(2) of the Pipeline Regulation pursuant to the Pipeline Act, a licensee must prepare a specific ERP for all sour production facilities and associated gathering systems requiring a plan and submit the ERP to the EUB for approval.

1.4.4 Specific ERPs for HVP Pipelines

In accordance with Section 50.2(1) of the Pipeline Regulation pursuant to the Pipeline Act, a licensee must prepare ERPs for pipelines transporting HVP products and submit the ERP to the EUB for approval.

1.4.5 Spill Response Contingency Plans

In accordance with Section 8.052 (1) of the OGCR and Section 50.3(1) of the Pipeline Regulation pursuant to the Pipeline Act, a licensee of an oil well, a saltwater disposal well, or a liquid pipeline must develop and submit for approval a spill response contingency plan encompassing production and pipeline facilities and trucking routes. Unless the licensee is an active oil spill cooperative member in the area where its operations are located, the licensee must also purchase spill cleanup equipment to ensure that environmental risk to a body of water is minimized.

1.4.6 Specific ERPs for Hydrocarbon Storage in Caverns

In accordance with Sections 8.005(1) and 8.005(2) of the OGCR, a licensee must prepare a specific ERP for hydrocarbon storage in caverns and submit the ERP to the EUB for approval.

2 Initial Planning Requirements for Specific ERPs

2.1 Determination of the Emergency Planning Zone (EPZ)

The EPZ is a priority area surrounding a well, pipeline, or facility where immediate response actions are required in the event of an emergency. A licensee must determine an initial EPZ using methodology defined below that delineates the area of greatest immediate impact from an uncontrolled release of hydrogen sulphide (H_2S) or HVP product.

Once the licensee establishes the size of the EPZ, it must carry out the necessary public and local government notification and consultation described in Section 2.2 and in *Guide 56: Energy Development Applications Guide and Schedules* prior to the development of a specific ERP.

2.1.1 Sour Well EPZs

The initial size of a sour well EPZ is determined by the wellhead absolute open flow (AOF) according to the type of well operation (see Table 1). The H_2S release rate is determined by multiplying the maximum H_2S content by the wellhead AOF. There is no consideration given for subsurface safety valves in determining the maximum potential H_2S release rate. *Guide 56* provides a detailed methodology for determining release rates.

Table 1. Flow rate determination for EPZ calculation

Type of well operation	Wellhead AOF determination
Drilling	Up casing/open hole
Completion	Up casing
Producing/Injection	Up tubing
Servicing	Up casing (if tubing removed)

Equations for calculating the EPZ are as follows:

- For release rates $0.01\ m^3/s < Q < 0.3\ m^3/s$ $R = 2.0\ (Q^{0.58})$
- For release rates $0.30\ m^3/s < Q \leq 8.6 m^3/s$ $R = 2.3\ (Q^{0.68})$
- For release rates $Q > 8.6\ m^3/s$ $R = 1.9\ (Q^{0.81})$

where Q is the H_2S release rate in cubic metres per second (m^3/s) (dimensionless number in the above equations) and R is the EPZ radius in kilometres (km). (Figures 1 and 2 in Appendix 4 are plots of these equations.) **The actual size and shape of the final EPZ must reflect site-specific features of the area and information gathered during the public involvement process.**

A licensee commingling production from sour gas pools should be aware that commingling production from two or more sour pools could increase the size of the EPZ. It is the licensee's responsibility to ensure that the EPZ is amended to reflect any commingled production operations at the well and to ensure that all safety-related matters have been addressed and the affected public have been informed.

2.1.2 Sour Production Facility EPZs

The EPZ for a sour production facility is calculated by using the largest H_2S release volume from any pipeline entering or leaving the facility. If the facility has an acid gas disposal well on site, the EPZ for the well may determine the size of the EPZ for the sour production facility. Graphs for determining sour production facility EPZs are in Figures 3 and 4 of Appendix 4.

2.1.2.1 Sour Pipeline and Sour Multiphase Pipeline EPZs

The EPZ for a sour pipeline or a sour multiphase pipeline is determined using the maximum licensed operating pressure, the internal diameter, and the licensed maximum H_2S concentration to calculate the H_2S release volume in cubic metres (m^3) for each segment of pipeline. The release volume at the break point is the drained volume, which may be the sum of release volumes from several segments that may exist between emergency shutdown valves (ESDs) and check valves. The equation for calculating the maximum potential H_2S release volume is found in Appendix 4. For sour multiphase pipelines, the volume of H_2S is determined by multiplying the gas-oil ratio (GOR) at atmospheric conditions by the volume of the system and the licensed H_2S concentration.

An H_2S release volume must also be calculated for pipelines that transmit sour gas or a sour multiphase product containing less than 10 moles of H_2S per kilomole of natural gas in order to determine the size of the EPZ.

The release volume calculation for pipelines assumes that

- ESDs close instantaneously upon failure of the pipeline and check valves close instantaneously downstream of the failure; and
- manual block valves do not close instantaneously and the entire volume of gas in that segment of the pipeline is released.

Graphs for determining pipeline EPZs using the maximum H_2S release volumes are found in Figures 3 and 4 in Appendix 4.

2.1.3 Reduced EPZs

The requirements specified in *Interim Directive (ID) 2001-5: Site-Specific Emergency Response Plans for Sour Operations, Emergency Planning Zones, and Reduced Planning Zones* continue to apply to the use of reduced EPZs until a comprehensive review is completed and new requirements are adopted. In addition to the requirements of *ID 2001-5*, all licensees requesting reduced EPZs are required to submit an H_2S release rate assessment for EUB approval prior to submitting the reduced EPZ request. When applying for an H_2S release rate assessment approval, the applicant should indicate in its application to the EUB Resource Application Group that the assessment is for a reduced EPZ.

A new sour pipeline or sour multiphase pipeline does not qualify for a reduced EPZ under *ID 2001-5*; however, if a currently approved sour production facility ERP contains pipelines for which reduced EPZs were granted, the EUB will consider an application for reduced EPZs for new pipelines added to the current ERP.

2.1.4 HVP Pipeline EPZs

There is currently no established procedure for calculating an EPZ for HVP pipelines. Licensees must conduct a plume dispersion assessment based on release volumes for each segment of pipeline. The volume release at the breakpoint is the drained volume, which may be the sum of release volumes that exist between ESD valves and check valves.

The Canadian Association of Petroleum Producers (CAPP) guidelines[1] recommend an EPZ of 1.5 times the distance from the point of release to the isopleth representing the 50 per cent lower flammable limit (LFL). Further requirements for HVP pipeline EPZs will be incorporated into the next edition of this guide following a comprehensive government/stakeholder review.

2.1.5 EPZs for Hydrocarbon Storage in Caverns

There is no established procedure for calculating an EPZ based on release of hydrocarbons stored in caverns. A licensee may use the current industry EPZ of 0.8 km until such time as a government/stakeholder committee has studied the issue and presented recommendations for incorporation into the next edition of this guide.

2.2 Public and Local Government Involvement in Emergency Preparedness and Response

2.2.1 Overview

Expectations and requirements detailed in this guide apply to notification of and consultation with all Alberta communities, including First Nations and Metis settlements. Public and local government involvement in emergency preparedness and response must take place at various stages of resource development, including

- prior to submitting an application to the EUB or developing a specific ERP for new wells, pipelines, and facilities or major modifications to existing ones resulting in significant change to EPZs or procedures;
- prior to completion, servicing, or testing operations that are not carried out consecutive to drilling operations;
- once every two years for existing wells, pipelines, and facilities with approved specific ERPs; and
- after finalization of sale agreement and prior to the transfer from one licensee to another of wells, pipelines, and facilities requiring specific ERPs.

A licensee must address public and local government involvement requirements described in this section prior to final development of specific ERPs. These requirements are considered to be minimums. The following requirements complement and also add to those described in *Guide 56*. Other guidelines, such as CAPP's *Guidelines for Effective Public Involvement* may also assist in preparing for and conducting public involvement programs.

ID 2001-5 details additional public notification requirements for critical sour well ERPs where reduced EPZs are requested. This interim directive remains in effect until the comprehensive review of reduced EPZs is completed.

[1] Canadian Petroleum Association (CPA) Guide: *An Emergency Response Planning Process Guideline for HVP Operators in Alberta*, July 27, 1992.

A licensee must record all supporting information pertaining to public and local government involvement programs, including information regarding unsuccessful attempts to contact or obtain the cooperation of any required persons and any outstanding issues to be resolved, and must disclose that information to the EUB.

2.2.2 Preparation for Public and Local Government Involvement

2.2.2.1 Public

Prior to conducting a public involvement program, a licensee must identify all persons, residences, local authorities, and publicly used facilities within and immediately adjacent to the EPZ that should be consulted and included in the ERP, such as

- permanent and part-time residents, including those residing on dead-end roads beyond the EPZ where occupants must egress through the EPZ;
- private and public recreational property owners, operators,, and occupants;
- business owners and operators and industrial operators, including oil and gas operators;
- registered trappers, guides, outfitters, and grazing lease and allotment users;
- appropriate local municipal (rural and urban) authorities, including disaster emergency services and health authorities;
- any individuals known to the licensee who may have special needs and should be included in the ERP based on previous industry experience in the area; and
- publicly used facilities, such as schools, community centres, senior citizen centres, registered and random campgrounds, and picnic areas.

This identification can be accomplished through such means as

- discussions with community leaders and municipal officials,
- contacting other industrial operators in the area,
- reviewing EUB hearing decision reports and identifying special conditions that may have been placed on previous approvals in the area,
- contacting applicable local public interest groups,
- contacting applicable provincial government departments and agencies, and
- requesting and reviewing land titles for the area.

In the event that an EPZ intersects a rural subdivision, the entire subdivision must be included within the EPZ. If an EPZ includes a portion of an urban centre, the licensee is not required to identify each individual residence within the urban centre; however, contact must be made with the urban disaster services agency prior to conducting public involvement to establish and agree upon roles and responsibilities.

During public involvement programs, the licensee must make individual residences in the urban centre aware that they are within the EPZ and of the public protection measures in place in the event of an emergency. This should be done through appropriate notification, such as mail-outs, open houses, and newspaper advertisements.

All publicly used facilities, such as schools, community centres, senior citizen centres, registered campgrounds, and picnic areas within the area from the edge of the calculated EPZ radius to twice the calculated EPZ radius must also be identified in the ERP; however, direct contact or consultation is not required.

2.2.2.2 Local Government

Clear identification of the roles and responsibilities to be carried out during an emergency is essential to public safety. The local municipal authorities (rural and urban) have a mandated responsibility to protect the public within their area of jurisdiction and play a key role in the licensee's emergency response. The licensee remains responsible for ensuring that appropriate emergency response measures are in place and can be implemented, including those for areas of potential impact beyond the EPZ. These responsibilities must be clearly outlined in the ERP.

Therefore, coordination of roles and responsibilities with the local municipal authorities, including the director(s) of Disaster Services of all municipalities within and adjacent to the EPZ, the medical officer of health (or designate) and/or the director of Environmental Health services of affected regional health authorities and/or environmental health officers for First Nations and Inuit Branch Health Canada (FNIHB-HC) must take place, be well understood, and agreed to prior to conducting the public involvement program. If changes are required as a result of public consultation, further discussions must take place with the appropriate local government authority. This allows for quick and efficient response to any emergency that may occur at a licensee's operations and supports the goal of protecting the public, including those outside of the EPZ and within urban centres, from adverse impact.

If a licensee has a mutual aid and emergency response agreement with local government authorities and other responders, this must be referenced in the ERP so that roles and responsibilities are clear. This is to ensure that there is no confusion or misunderstanding of the roles and responsibilities in the event of an incident requiring activation of the ERP.

2.2.3 Developing Public Information Materials

A licensee is required to develop an information package for distribution to all persons identified in Section 2.2.2.1 during the public involvement process. This package must contain sufficient information to allow the parties to understand the proposed or existing operation, the impact an emergency may have on them, the procedures in place to respond to an emergency, and public protection measures.

As a minimum, an information package must include

- a description of the proposed or existing wells, pipelines, or facilities covered by the ERP;
- identification of the potential hazards associated with the wells, pipelines, or facilities;
- H_2S concentrations, release rates, release volumes, and EPZ determinations for all wells and pipelines;
- a map of the operations in the general area;
- a 24-hour emergency licensee contact telephone number (the EUB requires a call to this telephone number to initiate immediate actions), a local EUB Field Centre telephone number, and local municipal disaster services telephone numbers;
- a description of potential health impacts that could result from exposure to H_2S, sulphur dioxide (SO_2), or any other toxic or hazardous substance that could be released;
- information on special emergency procedures unique to the community, such as hospitals and schools, that could affect emergency response;

- appropriate public protection measures;
- procedures in place to respond to an emergency; and
- additional EUB documents as set out in *Guide 56*.

Prior to commencement of the public involvement program, a copy of the public information package must be provided to the local EUB Field Centre so that staff can respond to questions and concerns. A copy must also be submitted to the EUB Operations Group with the submission of the ERP.

2.2.4 Conducting Public Involvement Programs

A licensee is required to conduct public involvement programs for the development of an ERP in conjunction with other notification or consultation programs covered in *Guide 56*. This ensures that there is no confusion regarding the details of the project and the impact that an emergency situation may have on the surrounding community.

Licensee representatives who have the necessary background to provide details of the emergency procedures in place and to address questions and concerns that may arise must conduct the public involvement program in person with all identified individuals. A licensee representative must address any special request for modifications to the ERP and for additional information.

A licensee is required to review key emergency response information with all members of the public identified in the ERP or with the Disaster Services representative for urban centres. This ensures that members of the public are familiar with potential emergencies and corresponding public protection measures pertaining to emergency response procedures.

If more than one licensee is conducting a public involvement program in the same area, the EUB strongly encourages that a single licensee representative who has the information and delegated authority represent the other licensees. All parties must be provided with the opportunity for follow-up discussions with the appropriate licensee representative if concerns arise.

The EUB recognizes that licensees may sometimes have difficulty establishing contact or meeting in person with

- residents or other persons who may be away for extended periods of time, have "no trespassing" signs posted on their property, or have unlisted telephone numbers; and
- nonresident persons, such as registered trappers, industrial operators, and recreational property owners, operators, and occupants.

The EUB requires the licensee to make a reasonable effort to contact these parties and to arrange a suitable meeting time or provide an information package by registered mail with an offer to meet to address any questions and concerns regarding emergency preparedness and response. If a licensee is unable to make contact with an individual, the licensee must retain a record of the attempts made to contact that individual. It is the licensee's responsibility to show that reasonable efforts were made.

A licensee must provide all parties with a copy of the public information package, as detailed in Section 2.2.3, along with an opportunity to discuss the information. Licensees are expected to provide a reasonable amount of time, having regard for the specific

circumstances of the individual, for parties to review an information package and have questions and concerns addressed.

A licensee is required to obtain the following information from all persons, residences, local authorities, and public facilities listed in Section 2.2.2.1:

- exact location of the residence or place of business, including egress routes (legal description or address);
- name of key contact and a 24-hour contact telephone number (home, business, cell phone, or other) and an alternate contact;
- names of all family members in residence;
- number of occupants, specifying adults and preschool and school-age children;
- names of those with special needs, such as those who require evacuation assistance, request early notification/communication, have no telephones, require transportation assistance, or for whom there may be a language barrier;
- any additional concerns or comments; and
- any other information deemed necessary to ensure that effective emergency response procedures are developed.

While members of the public are not legally required to provide personal information, the licensee must clearly explain that the information is important to ensure an effective emergency response and thus provide public protection and safety. Personal information is protected by the privacy provisions of the Freedom of Information and Protection of Privacy Act (FOIP) and must be kept confidential at all times.

In keeping with the spirit of FOIP, a licensee must only acquire information necessary to the ERP, and this information should only be provided to key emergency responders who require it for immediate response purposes in the event of an emergency and to the EUB. If members of the public are unwilling to provide personal information, a licensee must consider those residents to have special needs and include the appropriate emergency response measures, such as early notification, in the ERP.

Public concerns about livestock and pets in emergency situations should be addressed during the public involvement program. Although public safety is the primary purpose of emergency preparedness and response, licensees should address livestock and pet safety in the ERP when feasible.

3 Corporate-Level ERPs

3.1 Requirements

Specific emergency response plans are not required for every drilling, production, or pipeline operation in the province. In these situations the EUB requires a licensee to have preplanned procedures available that will allow for effective response to an emergency. The corporate-level ERP must address the basic fundamentals of how the licensee will handle such an emergency.

A licensee must determine the level of detail required to address each item in a corporate-level ERP, depending on the nature of the operations that it covers. Corporate-level ERPs must meet all the requirements specified in CAN/CSA Z-731, as well as including information on

- classifying incidents and possible responses for specified incidents,
- a communications plan that addresses
  - communications with response team, support services, and government,
  - communications with the public and media, and
  - downgrading emergency levels,
- responsibilities of licensee personnel, and
- emergency response management centres.

3.1.1 Criteria Matrix for Classifying Incidents and Possible Responses

All incidents are classified as either an alert or an emergency (level 1, 2, or 3). Incidents that can be handled on site through normal operating procedures are typically defined as alerts, while those with a more complex resolution are usually defined as emergencies.

Table 2: Criteria Matrix for Classifying Incidents must be included in a corporate-level ERP and used to classify all incidents. The table considers the risk, control, containment, and impact on safety and the environment in arriving at a classification. A licensee should be aware that an emergency level might be declared due to one or more of the control, containment, and impact criteria being met. As a minimum, the actions outlined in Table 3: Possible Responses for Specified Incidents must also be included in a corporate-level ERP.

In addition to these requirements, a corporate-level ERP must also define appropriate actions, including public protection measures that the licensee could take at each level of emergency. For information regarding public protection measures required for sour gas, see Section 4.3.

3.1.2 Communications Plan

Procedures must be established and detailed in the ERP for contacting and maintaining communications with key licensee personnel, government, support services, members of the public (within and outside of the EPZ), and the media. The licensee is required to identify all key communications systems and equipment needed to effectively respond to an emergency.

Table 2. Criteria matrix for classifying incidents

Criteria	Alert: Minimal	Emergency*		
		Level 1: Low	Level 2: Medium	Level 3: High
Risk Control	Immediate control of hazard, with progressive resolution of the situation.	Immediate control of hazard is becoming progressively more complex because of deteriorating conditions.	Imminent and/or intermittent control of the hazard is possible.	Imminent control of the hazard is not possible.
Containment	Control and relief systems functioning correctly.	Control and relief systems functioning correctly.	Some control and/or relief systems not operational.	Key control and relief systems not operational.
Impact				
Public/worker safety	On site only.	On site, with possible impact off site.	On site, with possible impact off site.	Potential for public safety to be jeopardized.
Environment	On site only.	On site, with some potential off site. Minor or short term.	On site, with some off site. Minor or short term.	On site, with significant off site. Long term.

* All emergency levels are declared using the criteria matrix only.

3.1.2.1 Communications with Response Team, Support Services, and Government

An ERP must clearly define the responsibility to contact the EUB and other responders in the event of an emergency. The EUB must be notified immediately at any level of emergency.

The level of emergency is determined by the licensee according to its plan and confirmed through consultation with the EUB. The licensee must also contact agencies and services required to assist with initial response, which may include contacting the local authorities at a level-1 emergency if required. At a level-2 or -3 emergency, the EUB contacts Emergency Management Alberta, which implements fan-out calls to the required government departments and agencies, as indicated in Figure 2.

3.1.2.2 Communications with the Public and Media

The ERP must clearly describe procedures that will be implemented during the incident to contact and maintain communications with directly impacted members of the public in order to keep them informed of the situation and actions being taken. This includes plans for communicating and implementing public protection procedures, such as evacuating and sheltering occupants within and beyond the EPZ.

The ERP must also clearly describe procedures that will be used to inform and update the media and provide assistance in getting factual messages out to the public at large in an expeditious manner.

Media releases must be generated and released as significant developments occur. A licensee coordinates media releases with the EUB prior to release to ensure consistency

Table 3. Possible responses for specified incidents

Responses	Alert	Emergency		
		Level 1	Level 2	Level 3
Communications				
Internal	Discretionary, depending on company policy.	Discretionary, depending on company policy.	Immediate notification of off site management.	Immediate notification of off-site management.
External public	Courtesy at company discretion.	Mandatory for individuals within the EPZ requiring notification.	Planned and instructive as per the specific ERP.	Planned and instructive as per the specific ERP.
Media	Reactive, as required.	Reactive, as required.	Proactive-media management to local or regional interest.	Proactive-media management to national interest.
Government	Notify EUB if public contacted	Notify EUB and local authority, if required for initial response.	Notify EUB and local authority.	Notify EUB and local authority.
Actions				
Internal	On site, as required by company.	On site, as required by company. Initial response undertaken in accordance with the specific or corporate-level ERP.	Predetermined public safety actions are under way. Corporate management team alerted and may be appropriately engaged to support on-scene responders.	Full implementation of emergency management system.
External	On site, as required by company.	On site, as required by company.	Potential for multi-agency (operator, municipal, provincial, or federal) response.	Immediate multi-agency (operator, municipal, provincial, or federal) response.
Resources				
Internal	Immediate and local. No additional personnel required.	Establish what resources would be required.	Limited supplemental resources or personnel required.	Significant incremental resources required.
External	None.	Begin to establish resources that may be required.	Possible assistance from government agencies and external support services, as required.	Assistance from government agencies and external support services, as required.

and accuracy of information. Information is communicated through written news releases, news conferences, and any other effective means the licensee chooses to use. A licensee spokesperson is identified to carry out this role and to interact with the EUB and other applicable government agencies.

The following information must be released to the general public as soon as possible during an incident:

- type and status of incident,
- location and proximity of the incident to people in the vicinity,

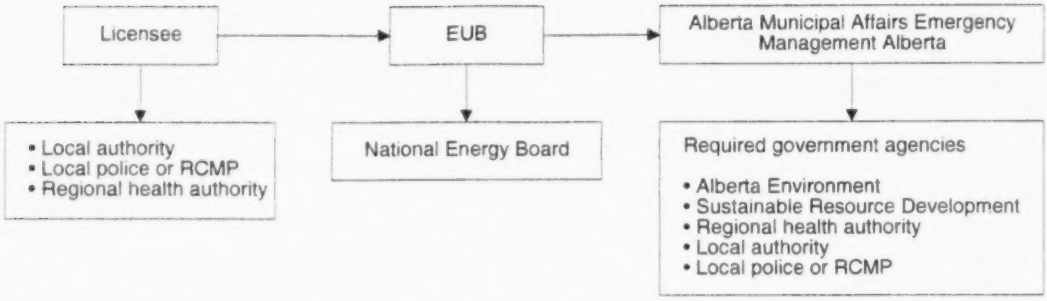

Figure 2. Fan-out procedures

- areas impacted by the incident,
- effects the incident may have on people in the vicinity,
- actions the general public should take if they experience adverse effects,
- description of the products involved and their short- and long-term effects,
- public protection measures to follow, evacuation direction, and any other emergency response measures to consider,
- actions being taken to correct the situation and time period anticipated, and
- contacts for additional information.

The EUB may release information when a licensee is late in complying or fails to comply with the above. In any case, the EUB may choose to issue a media release as it perceives the need.

3.1.2.3 Downgrading Emergency Levels

Once a situation improves, the decision to downgrade a level-2 or -3 emergency is made by the licensee in consultation with the EUB and local and provincial disaster service authorities.

All affected persons and the media must be kept informed of the status of an emergency.

3.1.3 Responsibilities of Personnel

The ERP must identify specific roles and responsibilities of personnel required to effectively respond to any emergency. Key personnel and responders and their alternates must also be identified. One or more functions can be assigned to an individual, depending on the complexity of the potential response to an emergency.

The following responsibilities must be assigned to specific personnel as applicable

- field incident command,
- public safety coordination, including evacuation and sheltering,
- security (roadblocks, rovers, etc.),
- air quality monitoring,
- on-site safety and ignition, and
- communications with the responders and media/public communication.

3.1.4 Response Management Centres

The ERP must describe how the licensee will manage and coordinate a response to an emergency. It must identify which response management centres are to be activated as a result of a worst-case emergency at its operations, address the roles and responsibilities of personnel at each centre, and outline how coordination and communication between centres will be managed.

The ERP must clearly outline the communications procedures to be used between response management centres to ensure adequate information flow among licensee representatives and other responders at the emergency site, corporate-level decision-makers, the EUB, and other government departments and agencies. The *Upstream Petroleum Incident Support Plan* provides details on the usual roles and responsibilities of the centres, at which level of emergency each may be activated, the persons who should attend, and required communication links. A licensee must use the same terminology for the centres as in the government plan.

In the event that evacuation is required, a licensee must activate a reception centre located outside the EPZ. For wells with a small number of residences in the EPZ, a reception centre may not be necessary if the licensee can demonstrate that the location of residents can be managed effectively without one. The ERP must identify the licensee representative responsible for opening the reception centre and meeting evacuees. Any concerns the evacuees may have should be addressed at this time. Once evacuees have been registered at the registration centre and have indicated where they may be contacted, they are free to go as they please, or if they wish it, the licensee must provide assistance in arranging temporary accommodation.

4 Sour Gas and Sour Multiphase ERPs

4.1 Requirements

This section sets out the EUB's minimum required content for different types of specific sour gas and sour multiphase ERPs. It also specifies under what circumstances each type of plan is acceptable. Specific ERPs for sour gas and sour multiphase operations must address all requirements outlined in CAN/CSA Z-731 and Sections 2 and 3 of this guide, as well as information on

- types of ERPs, requirements, and content,
- public protection measures,
- maps and equipment lists,
- mutual aid agreements,
- telephone lists,
- post-incident assessment,
- plan distribution and maintenance, and
- reporting and record keeping.

4.2 Types of ERPs, Requirements, and Content

A licensee must determine which of the following types of specific ERPs are required

- sour well ERP
- sour production facility ERP
- supplemental information to an existing sour production facility ERP

4.2.1 Sour Well ERPs

A licensee must submit an ERP for all sour well operations and situations listed in Table 4 and for any other situation where the EUB determines a plan is required. As noted in the table, surface development within the EPZ influences whether an ERP is required.

Table 4. Requirements for sour well ERPs

Well type	Operation	Surface development within the EPZ*		No surface development within the EPZ
Critical sour	Drilling, completion, servicing, or testing	Yes		Yes
	Drilling	Yes		No
		Wellhead on	Wellhead off	Wellhead on/off
Noncritical sour	Completion, servicing, or testing	No	Yes	No

* Includes surface development adjacent to the EPZ.

Supplemental information on a current sour production facility ERP will be accepted in place of a new ERP if the requirements outlined in Section 4.2.2.1 are met. An ERP for a sour well is in effect immediately after drilling out surface casing.

All critical sour well ERPs must be

- approved by the EUB in conjunction with the well licence;
- on site prior to drilling out surface casing;

- approved and on site prior to commencement of any completion, servicing, or testing operation.

All noncritical sour wells ERPs must be
- submitted to the EUB in conjunction with the well licence application;
- approved prior to spud and on site prior to drilling out surface casing;
- approved and on site prior to commencement of any completion, servicing, or testing operation.

For completion, servicing, and testing operations, on-site activities such as rigging up and spotting of equipment may proceed without having the ERP on site. However, removal of any component of the wellhead is not allowed.

If an ERP has been approved for drilling, completion, servicing, or testing operations and the operations covered by the ERP have not occurred within a year of issuance of the ERP approval, the approval expires and a new plan must be submitted for review and approval.

For all critical and noncritical drilling, completions, servicing, or testing operations, the licensee must conduct a meeting and a review of its ERP with on-site personnel required to implement the plan no more than 96 hours before conducting operations in the first sour zone. All on site personnel who have assigned roles and responsibilities in the ERP are required to participate at the meeting. The ERP review must include
- confirmation that the emergency contact phone numbers are current, and
- a discussion of the licensee's response procedures and assigned responsibilities.

More than one meeting may be required if personnel change over the life of the project. For critical sour wells, the licensee must also advise the EUB and other applicable government departments and agencies of the meeting in advance so they may participate. Meetings for noncritical wells normally do not require the involvement of government departments and agencies. Documentation of all meetings, such as meeting sign-in sheets, invitations, and minutes, must be retained for a period of one year for audit purposes.

The sour well ERP must address all details outlined in Sections 2 and 3 and include the following information for specific sour well ERPs:
- plan distribution list (see Section 4.10)
- area map (see Section 4.4)
- introduction and summary
  - key licensee contacts (24-hour numbers)
  - appropriate EUB Field Centre number (24-hour emergency number)
  - name and legal description of well (surface and bottomhole location)
  - maximum cumulative H_2S release rate and concentrations
  - sour well level designation for production
  - size and configuration of the calculated and/or approved reduced EPZ
  - general land use and population density in the area (number of residents or level of transient use, public facilities, roads, type of land use, etc.)
  - proximity to the nearest urban centre and residence
  - expected spud date, date of entry into the sour zone, and time in the sour zone
- criteria matrix for classifying incidents and possible responses (see Section 3.1.1)
- personnel responsibilities (see Section 3.1.3)
- communications plan (see Section 3.1.2)
- public protection measures (see Section 4.3)

- resident information (see Section 2.2.4)
- emergency telephone list (see Section 4.7)
- government involvement (see Section 2.2.2)
- reporting and record keeping (see Section 4.12)
- equipment list (see Section 4.5)
- mutual aid agreements (see Section 4.6)
- post-incident assessment (see Section 4.8)
- plan maintenance (see Section 4.11)

ERPs may be developed and submitted for multiple well programs if site-specific information for each of the wells involved is included. Common procedures and infrastructure may be developed for the entire program as long as it remains current for the duration of the project.

If testing operations involve the use of 21-day temporary pipelines, the licensee may choose to include this operation as part of the specific ERP, provided that site-specific information and procedures are included. The licensee may also choose to submit this operation under a separate plan or as a supplement to a sour production facility ERP (see Section 4.2.2.1).

Those holding a copy of the specific sour well ERPs and residents listed in the ERP must be notified at the end of drilling, completion, servicing, or testing operations and advised of the status of the plan.

4.2.1.1 Overlapping EPZs

A licensee conducting sour drilling, completion, servicing, or testing operations where two or more well operations are in close proximity to one another such that the EPZs overlap must

- establish and document communications between licensees, and
- jointly confirm whether EPZs overlap and if sour operations are scheduled to take place simultaneously.

This applies to overlapping calculated EPZs unless the EUB has approved reduced EPZs, in which case the policy applies to the reduced zones only. The EUB will not allow more than two wells with overlapping EPZs to conduct simultaneous sour operations.

If simultaneous operations are scheduled for two wells with overlapping EPZs, a licensee must advise residents that they are within the overlapping portion of the EPZs and ensure that they are familiar with the public protection measures that have been set out. A licensee must follow the procedures outlined in Table 5.

4.2.1.2 Sour Underbalanced Drilling Operations

As detailed in *ID 97-6: Sour Well Licensing and Drilling Requirements*, the EUB prohibits sour underbalanced drilling operations if residents are located inside the calculated EPZ. The EUB will, however, consider licensing sour underbalanced drilling operations where residents will be temporarily moved from the EPZ during drilling operations.

Table 5. Required procedures for overlapping EPZs

Procedures	Critical sour wells		Noncritical sour wells	
	Residents	No residents	Residents	No residents
Review and modify ERPs as required.	Yes	Yes	Yes	No
Advise EUB Operations Group and appropriate Field Centre prior to conducting sour operations.	Yes	Yes	Yes	No
Maintain communications among licensees.	Yes	Yes	Yes	Yes
Once the first well penetrates approximately 1 m into the critical zone, the second well may proceed to penetrate the critical zone.	Yes	Yes	N/A	N/A
If both wells are conducting sour operations and an emergency level is declared at either well, the second well must suspend operations until the emergency is over.	Yes	No	Yes	No

4.2.2 Sour Production Facility ERPs

A licensee must submit ERPs for sour production facilities and associated gathering systems when

- a critical sour well is part of the gathering system,
- there is surface development within the calculated EPZ of any sour well associated with the sour production facility, or
- there is surface development within the calculated EPZ of any pipeline containing H_2S, associated with the sour production facility.

All required new sour production facility ERPs, as well as any supplemental information to a current sour production facility ERP for newly added wells and pipelines, must be approved by the EUB before commencement of operations. An approved copy of the sour production facility ERP must be kept on site and made available to EUB inspectors when requested. If an existing sour production facility is sold to another company, the new licensee must submit an ERP to the EUB for approval within 30 days of the change of ownership. Both licensees must ensure that emergency response procedures to protect the public will not be compromised prior to approval of the new ERP.

When a new facility is constructed for which an ERP is required or there are major modifications to an existing facility which significantly changes the roles and responsibilities of implementing an ERP, the licensee must hold a meeting with licensee personnel and extend invitations to government departments and agencies and other responders who have a role in initial response within 30 days prior to facility start-up. Documentation of all meetings, such as meeting sign-in sheets, invitations, and minutes, must be retained for a period of one year for audit purposes.

A sour production facility ERP must address all details outlined in CAN/CSA Z-731 and Sections 2 and 3 and include the following information:

- plan distribution list (see Section 4.10)
- area map (see Section 4.4)

- introduction and summary, which includes
  - key licensee contacts (24-hour number)
  - appropriate EUB Field Centre number (24-hour emergency number)
  - name and location of the sour production facility
  - general land use and population density within the gathering system (number of residents or level of transient use, public facilities, roads, type of land use, etc.)
  - date of latest revision
- wells, pipelines, and sour production facilities information, which includes
  - location of wells, ESDs, pipelines, and facilities
  - maximum potential H_2S release rates and volumes for all wells and pipeline segments within the system; maximum licensed operating pressure, internal diameter, licensed H_2S content for pipelines, length of pipeline between emergency shutdown valves, compressibility factor, and pipeline minimum operating temperature
  - size of the EPZs for all wells and pipelines
  - production facility and gathering system codes, and pipeline licence numbers
- procedures for emergency detection, notification, and confirmation, which includes
  - a description of how an emergency will be detected
  - a description of how the licensee will be alerted of an incident
  - a description of how confirmation of a release will occur
- criteria for classifying incidents and possible responses (see Section 3.1.1)
- personnel responsibilities (see Section 3.1.3)
- communications plan (see Section 3.1.2)
- public protection measures (see Section 4.3)
- resident information (see Section 2.2.4)
- emergency telephone listing (see Section 4.7)
- government involvement (see Section 2.2.2)
- mutual aid agreements (see Section 4.6)
- post-incident assessment (see Section 4.8)
- plan maintenance (see Section 4.11)

Sour production facility ERPs must be reviewed and updated at least annually (within 12 months of the date of the last submitted sour production facility ERP to the EUB) and necessary changes made at that time. The EUB requires resident contact information to be included in these updates. Resident contact information may be updated through means other than direct contact, such as by telephone confirmation.

4.2.2.1 Supplemental Information to Current Sour Production Facility ERPs

If a current sour production facility ERP exists that specifically addresses procedures for drilling, completion, servicing, or testing operations, a licensee may choose to submit supplemental information for approval of these operations in place of a new ERP. The current ERP must meet the requirements outlined in Table 6.

As a minimum, the following supplemental information to the sour production facility ERP must be submitted to the EUB:

- complete resident information for drilling, completion, servicing, or testing operations (see Section 2.2.2),
- well or pipeline location,
- the maximum cumulative H_2S release rate of all zones open to the wellbore, or in the case of a 21-day temporary surface pipeline, the H_2S release volume for each segment of pipeline,

Table 6. Supplemental information requirements

Operation	Requirements
Drilling of critical or noncritical sour wells	A current sour production facility ERP that addresses the following: • All information listed in Section 4.2.2 • Emergency response procedures specific to drilling of wells • Personnel responsibilities specific to drilling • Entire well EPZ included within the sour production facility EPZ
Completion, servicing, or testing of • Critical sour wells • Noncritical sour wells (wellhead off)	A current sour production facility ERP that addresses the following: • All information listed in Section 4.2.2 • Emergency response procedures specific to the completion, servicing, or testing of wells • Personnel responsibilities specific to the completion, servicing, or testing of wells • Entire well EPZ included within the sour production facility EPZ
In-line testing using 21-day temporary surface pipelines	A current sour production facility ERP that addresses the following: • All information listed in Section 4.2.2 • Emergency response procedures and personnel responsibilities specific to in-line testing of wells • Entire pipeline EPZ included within the sour production facility EPZ

- the calculated EPZ,
- a map of the well or pipeline EPZ (as per Section 4.4), and
- a telephone list specific to the operations (as per Section 4.7).

A licensee must have supplemental information to a current sour production facility ERP and a copy of the sour production facility ERP on site during any drilling, completion, servicing, or testing operation. All holders of supplemental information for these operations must be notified upon completion of the operation and advised that the supplement is no longer in effect.

4.3 Public Protection Measures

ERPs must address key measures to protect the public during emergency situations.

4.3.1 Notification

The licensee must notify all residents within the EPZ prior to entering the sour zone for all critical and noncritical drilling operations. The ERP must identify those individuals within the EPZ requiring notification during a level-1 emergency. As a minimum, those members of the public must be notified at a level-1 emergency so they may decide whether to voluntarily evacuate. If necessary, licensee personnel may be required to provide early evacuation assistance because of an identified special need.

Notification to all others within the EPZ must begin no later than a level-2 emergency in conjunction with other mandatory protection measures. Notification to

the general public outside the EPZ must take place in conjunction with the local authority based on monitored air quality and other situations that might arise during the emergency.

4.3.2 Evacuation

Evacuation is the primary public protection measure for long-term releases if the public can be safely removed from an area during or prior to a release of sour gas. For any incident that may occur once a well has been spudded, the EUB requires the licensee to initiate public protection measures for the entire EPZ. **Evacuation of the public within the EPZ must be initiated no later than a level-2 emergency in accordance with actions defined in the specific ERP if the zone of highest H_2S release has been penetrated. Evacuation should commence with those downwind and closest to the release.**

In an incident where the zone of highest H_2S release has not been penetrated but other producing formations (sweet or sour) are open to the wellbore, the evacuation procedures may differ from the mandatory actions identified above. The ERP must address how each situation will be managed.

The ERP must include procedures for locating transients, such as hunters, trappers, and recreational users. Special procedures may be required for evacuating publicly used facilities.

If large numbers of people are involved, assistance with transportation (i.e., using school buses) or changes in the normal notification procedures may be required, and the ERP must address such situations.

Evacuation of the EPZ should take place before a release of sour gas has the potential to affect people off site or as soon as possible to avoid any exposure to H_2S. EPZ evacuation at a level-1 emergency is generally not required; however, as stated in Section 4.3.1, individuals identified in the plan as requiring notification must be contacted and provided the opportunity to evacuate or have assistance provided to evacuate because of an identified special need.

The public outside the EPZ must be notified and evacuated in accordance with criteria in Table 7 and in conjunction with the local authority responsible for the area. The *Upstream Petroleum Incident Support Plan* will also be activated by the government to provide assistance with general notification and evacuation of the public, if necessary. As a minimum, notification and evacuation beyond the EPZ is based on monitored levels of H_2S and SO_2 as given in Table 7.

Broadcast media (radio, television) will be used to notify residents outside the EPZ in the event that immediate evacuation of the area must take place. Evacuation of the area outside the EPZ should be a coordinated response through a licensee's ERP and the municipality plan.

4.3.3 Sheltering

Sheltering must be considered the primary protective measure in limited circumstances when

- there is not enough time or warning to safely evacuate the public that may be at risk,
- residents are waiting for evacuation assistance,

Table 7. Notification and evacuation requirements outside the EPZ*

H_2S concentrations in unevacuated areas	Requirement
1 ppm (1-hour average)	Notification of hypersusceptible individuals must begin.
Below 10 ppm (1-hour average)	Hypersusceptible individuals must be informed of the concentrations and advised to leave the area if health symptoms persist or increase. All other individuals should consider leaving the area and seek medical advice if health symptoms develop.
Exceeds 10 ppm (3-minute average) for 8 hours or more	Local conditions must be assessed and all persons may be advised to evacuate.
Approaching 20 ppm (3-minute average)	Immediate evacuation of the area must take place or the release must be ignited.
SO_2 concentrations in unevacuated areas	**Requirement**
0.3 ppm (24-hour average) 1 ppm (3-hour average) 5 ppm (15-minute average)	Immediate evacuation of the area must take place.

* This H_2S information comes from the Alberta Health and Weliness *Report on H_2S Toxicity*.

- there is a sour gas release of limited duration (e.g., due to a pipeline rupture),
- the location of a release has not been identified, or
- the public would be at higher risk if evacuated.

The ERP must identify the limited circumstances when sheltering would be considered as a viable option. When it is considered, sheltering instructions must be included in the ERP. Residents must be provided with sheltering instructions in the public information package.

4.3.4 Ignition Criteria for Sour Well Releases

This section does not deal with ignition criteria for critical wells with reduced EPZs. Specific ignition criteria for reduced EPZs are given in *ID 2001-5*. For all other sour wells, ignition must take place as soon as all personnel working at the site can be cleared to a safe distance under any of the following conditions:

- Any **uncontrolled** flow of sour gas: Ignition must occur within 15 minutes of the uncontrolled flow into the atmosphere.

- Any **partially controlled** flow of sour gas to the atmosphere under any of the following conditions:
  - Evacuation of the EPZ has not been accomplished.
  - Monitoring results indicate H_2S concentrations in excess of 20 parts per million (ppm) (3-minute average) in unevacuated areas.
  - Monitored H_2S concentrations exceed 1 ppm (1-hour average) in urban density developments.
  - Monitoring is not taking place due to weather or other unforeseen circumstances.
  - The release cannot be brought under control in the short term (ignition decision will be made in consultation with EUB).

A licensee must take immediate steps to prepare for ignition at the earliest signs of a well control problem to ensure there will be no delay. If the operator does not agree to ignite a release, the decision to ignite will be made by the EUB. Ignition does not negate the need for continuing with evacuation.

The decision-making authority to ignite the well must be assigned to a licensee representative on site. All ERPs must include ignition procedures, including a description of the equipment to be used in the event ignition criteria are met.

All critical sour wells must have a dual ignition system on site during all drilling, completion, servicing, or testing operations in the critical zone(s). The primary ignition system must be installed such that activation can be achieved from a safe location through a triggering device that allows for complete egress of all personnel from the well site prior to ignition taking place. The secondary system may be a manual system, such as a flare gun.

4.3.5 Isolation of the EPZ

A licensee must ensure that procedures are identified in the ERP and in place to isolate the EPZ. Roadblocks must be established to isolate the EPZ and prohibit unauthorized entry into the area upon the declaration of a level-2 emergency. It may be necessary to obtain a fire hazard order (issued by the EUB) or to declare a local state of emergency to restrict access to a designated area. A local state of emergency may be declared by the local authority should the incident escalate beyond the defined EPZ.

It also may be necessary for Transport Canada to issue a Notice to Airmen (NOTAM) to advise pilots of restrictions in the airspace above the EPZ or to close the airspace for a certain radius from the release (a no-fly zone). NOTAMs or closure of airspace may be requested by the EUB at a level-2 or -3 emergency.

4.3.6 Air Quality Monitoring

Air quality monitoring is required to track and record the presence and concentrations of H_2S and SO_2 during a sour gas or sour multiphase product release and following ignition of a release.

Air quality monitoring equipment is used to

- track the plume,
- determine if ignition criteria are met,
- determine whether evacuation and/or sheltering criteria have been met, particularly beyond the EPZ,
- assist in determining when the emergency can be downgraded,
- determine roadblock locations, and
- determine concentrations in areas being evacuated to ensure that evacuation is safe.

The type of air monitoring units and the number of monitors required are based on site-specific information, including

- access and egress points,
- population density and proximity to urban density developments, and
- local conditions.

For critical sour wells, if the calculated EPZ includes a portion of an urban density development, a minimum of two mobile air quality monitors are required: the first to monitor the boundary of the urban density development and the second to track the plume. The first unit must be on site during drilling, completion, servicing, or testing in potentially sour zones. The second unit must be dispatched at a level-1 emergency. Additional units may be required where there are multiple urban density developments.

Air quality monitoring must occur downwind, with priority being directed to the nearest unevacuated residence or areas where people may be present. Monitored H_2S and SO_2 information must be made available to Alberta Environment and the EUB, as well as the public, on a regular basis throughout a sour gas emergency.

The ERP must provide detail on the intended use and procedures surrounding the activation of air quality monitoring equipment, such as stationary and mobile air quality monitoring units and personal handheld monitors.

For noncritical sour wells, the licensee must decide whether a mobile air quality monitoring unit(s) will be placed on standby or dispatched to the wellsite at a level-1 emergency. Prior to entering the sour zone, the licensee must determine where the equipment is located and what the estimated travel time is to the wellsite. The minimum required criteria for mobile air quality monitoring equipment are outlined in Table 8 and must be addressed in the ERP.

4.4 Maps

Maps included in the ERP must be sized to provide a clear representation of the entire mapped area. Maps must clearly identify

- surface location(s) of the operation(s); access roads are required for specific well ERPs only
- EPZ boundaries being used (reduced or calculated)
- residence locations and reference numbers within the EPZ, including those residences bordering the EPZ or on dead-end roads requiring egress through the EPZ
- provincial, local, and access roadways and dead-ends
- topographical features, including lakes, rivers, streams, and any significant elevation feature that could affect either dispersion of a sour gas release or the ability to evacuate members of the public
- campgrounds, recreation areas, churches, schools, hospitals, and any other publicly used facilities within the mapped area
- trap line, grazing lease, and range allotment boundaries and their reference numbers for the full map area
- other industrial operations, including oil and gas operations
- locations of emergency shutdown devices
- railways and airports for the full map area
- corporate boundaries (hamlets, villages, towns, etc.) for the full map area
- a legend, scale, and north indicator
- potential roadblock locations
- urban density developments within an area twice the radius of the EPZ, or if using a reduced EPZ, within an area of the calculated EPZ radius

Note that

- EPZ maps must encompass an area at least twice the radius of the EPZ, and
- if a reduced EPZ is used, the map must encompass an area at least twice the radius of the reduced EPZ or to the distance of the calculated EPZ, whichever is less.

Table 8. Downwind mobile air quality monitoring requirements

	Level-1 emergency	Level-2 emergency	Level-3 emergency
Noncritical sour well	If estimated time of arrival is greater than the estimated time for gas to surface,[1] then dispatch to site. If estimated time of arrival is less than the estimated time for gas to surface, place on standby.	Deploy unit(s) from wellsite and commence mobile air quality monitoring.[2] If estimated time of arrival is less than the estimated time for gas to surface, dispatch.	Continue mobile air quality monitoring.
Critical sour well	If the calculated EPZ includes a portion of an urban density development, mobile air quality monitoring unit must be on the lease during sour drilling, completion, servicing, or testing of potential sour zones. Request additional air quality monitoring unit(s). **or** If there is no urban density development, a mobile air quality monitoring unit(s) must be dispatched to the wellsite at a level-1 emergency.	Deploy unit(s) from wellsite and commence mobile air quality monitoring. Request additional air quality monitoring unit(s), if required.	Continue mobile air quality monitoring. Request additional air quality monitoring unit(s), if required.
Pipelines containing sour gas	Deploy unit(s) to area of release and commence mobile air quality monitoring.	Continue mobile air quality monitoring. Request additional air quality monitoring unit(s), if required.	Continue mobile air quality monitoring. Request additional air quality monitoring unit(s), if required.

[1] An estimated time for gas to surface should be based on the time to circulate bottoms-up.

[2] If a mobile air quality monitoring unit has not arrived on site by the time that gas has reached the surface, ignition criteria may have been met for a partially controlled or an uncontrolled release.

When developing maps for sour production facility ERPs, the licensee may elect to omit illustrating all roadblock locations if procedures for establishing roadblocks are well defined in the plan. All third-party wells and pipelines tied into the production facility must be illustrated on the map; however, other area wells and pipelines may be excluded from the map as long as the contact information for those licensees is included in the plan. Additionally, for complex gathering systems, licensees may choose to map the boundaries for all of the EPZs combined, rather than each well or segment of pipeline.

4.5 Equipment List

A wide range of equipment is required to effectively respond to an emergency. The ERP must include a list of the following types of equipment:

- communications equipment (number, types of equipment, and radio frequencies)
  - Those requiring communications equipment include but are not limited to the evacuation coordinator, rovers, roadblock, and air monitoring personnel
- roadblock kits (number and contents)
- ignition equipment (maintained on site)
- gas monitoring equipment (number and type)

4.6 Mutual Aid Agreements

A licensee of a sour production facility is responsible for emergency response procedures for the entire gathering system. Any licensee of the gathering system associated with the facility must enter into a cooperative mutual aid agreement with the facility licensee operator to ensure appropriate initial response.

A licensee that requires the response of others or the use of resources from other responders should enter into mutual aid agreements with other parties, including other industry licensees and local authorities. The EUB's position differs from the CAN/CSA Z-731 in that regard. The agreement defines each participant's responsibilities for providing aid and support during an incident. Local authorities have legislated responsibility to respond to any incident that may impact the public. They may also assist the licensee with other responsibilities agreed to during planning.

CAPP has published the *Mutual Aid Agreements for Emergency Response Guideline* to assist upstream petroleum licensees in establishing mutual aid agreements. This guide may be used as a reference when designing mutual aid agreements.

4.7 Telephone Lists

Internal telephone lists must include key personnel designated to assist in emergency response, with a key contact name, alternate contact, and contact numbers (home phone, work phone, mobile phone, pager, and facsimile, etc.).

A telephone list of external emergency support services that may be required in an emergency, including government departments and agencies, communication services, air monitoring services, fire-fighting services, and oil spill cooperatives, must be compiled and regularly updated.

4.8 Post-Incident Assessment

Within 30 days of the end of an incident, a licensee must file with the EUB an operator incident summary report structured as outlined in Appendix 5. After reviewing the operator incident summary report, the EUB may require that the licensee attend a meeting to further discuss the incident.

4.9 Compensation

Representatives of industry associations, the public, and the EUB developed guidelines (*Informational Letter [IL] 89-20: Compensation in Case of Well Blowout*) for a process designed to facilitate agreement in the matter of compensation to the public for any resulting damage. Although the guidelines are specific to sour well blowouts, the process outlined in the IL is applicable to all types of emergency incidents.

4.10 Plan Distribution

As a minimum, a licensee must distribute copies of its specific ERPs to the government departments and agencies listed in Appendix 6 within five business days of receiving approval, unless the government agency requests otherwise in writing. A licensee is required to submit two paper copies of the ERP to the EUB for review and approval. It

may distribute the ERP to others electronically as long as a hard copy is provided upon request.

A licensee must ensure that additional copies (either full or partial) of the ERP are provided to all persons requiring one. The need for distribution is determined through communication with all responders during plan development. **Confidential resident and personal information must only be included in the EUB and key licensee copies.**

A licensee is also required to provide a copy of the ERP, excluding confidential resident and personal information, to any resident within the EPZ who requests in writing to have a copy. Once the ERP is submitted to the EUB, it is deemed a public document under the Freedom of Information and Protection of Privacy Act. A licensee must maintain a record of ERP distribution, including updates and amendments distributed.

4.11 Plan Maintenance

A licensee must distribute updates to ERP holders according to the requirements of Section 4.10. Changes in information that are instrumental to implementing the plan must be distributed to plan holders immediately, regardless of the regular review period. Errors identified in the ERP by the EUB, licensee, or other party are expected to be corrected in a timely manner.

4.12 Reporting and Record Keeping

A licensee's ERP must include procedures to be used for reporting and recording information during and following an emergency. These records provide documentation to be used for auditing, historical, and analytical purposes. A licensee must ensure that each key responder is provided instructions to be used for reporting and record keeping. All documentation recorded during and following an emergency must be retained and provided to the EUB upon request.

4.13 Training

A licensee must undertake training sessions on a regular basis for fulfilling functions defined in its ERP in accordance with CAN/CSA Z-731 to ensure that responsible personnel retain competency in emergency response procedures. Personnel must be trained and capable of carrying out their responsibilities at all times. The licensee can accomplish this by providing training sessions and response exercises.

4.14 Exercise Requirements

A licensee must test sour production facility and associated gathering system ERPs on a regular basis through the following types of planned exercises to promote emergency response preparedness:

- Tabletop, combined with a communications exercise, held annually for each area ERP, except in a year when a major exercise is held
- Major, once every three years for each area ERP

In situations where licensees have multiple area ERPs with the same response personnel and infrastructure, the ERPs may be tested simultaneously through one exercise.

Each licensee is required to notify the appropriate EUB Field Centre and the EUB Operations Group 30 days in advance of a scheduled exercise and invite representatives to participate or observe. The licensee is required to develop a report of exercise results to be maintained for audit purposes. The report must contain the following information:

- type of exercise held
- scope and objectives
- persons involved
- outcome (objectives achieved)
- lessons learned
- action plan, including timelines

Sour well ERPs do not require an exercise unless specifically requested by the EUB. However, as described in Section 4.2.1, a licensee must review its ERP by conducting a meeting with key responders no more than 96 hours before conducting operations in the sour zone(s).

5 High Vapour Pressure (HVP) Pipeline ERP Requirements

All HVP pipeline ERPs must be approved by the EUB before the pipeline is commissioned. A licensee must hold a meeting with required government departments, agencies, and responders within 30 days prior to commencement of pipeline operations.

A licensee must develop an ERP that is specific to its operations. As a minimum, an HVP pipeline ERP must address all related requirements outlined in CAN/CSA Z-731 and Sections 2 and 3 of this guide.

6 ERP Requirements for Hydrocarbon Storage in Caverns

A licensee operating caverns for storage of hydrocarbons must have an EUB-approved ERP prior to start-up of storage operations. A licensee must hold a meeting with required government departments, agencies, and key responders within 30 days prior to commencement of cavern storage operations.

The ERP must be custom designed for individual operations and address all related requirements outlined in CAN/CSA Z-731 and Sections 2 and 3 of this guide. Any further requirements for ERPs will follow from a comprehensive government/stakeholder review of cavern storage ERP requirements.

7 Spill Response Contingency Plans

7.1 Requirements

Consistent with the direction given in CAN/CSA Z-731, operators must assess the risk their operations pose to the environment and ensure adequate response capability in the event of a spill, particularly into moving water. Spill preparedness requirements apply to all wells (except those suspended in accordance with *ID 90-4: Suspension Guidelines for Inactive Wells*), facilities, and pipelines licensed by the EUB and cover all operations, such as drilling of wells and the injection, producing, and processing of liquids.

A licensee is exempt from the requirement to develop a spill response contingency plan or to purchase spill cleanup equipment if it is an active member in good standing of an oil spill cooperative in the area where its operations are located. A "member in good standing" means that licensee membership fees are fully paid up and that the licensee has met the obligations of that cooperative.

A licensee that is not a member of an oil spill cooperative must either join the oil spill cooperative or submit its own spill response contingency plan and obtain separate approval from the EUB. The plan must meet the same requirements stated in this guide where they relate to its specific operations. Details of any spill response contingency plan expertise provided by third parties must also be included where applicable.

7.2 Spill Response Contingency Plan Contents

If not exempted from Section 7.1, a licensee must have a plan in place to address a release of any liquid product onto land or water from a well, pipeline, or facility described above. The plan, in the form of a manual, must address the following components:

- a description of initial emergency response procedures and actions, as well as all contacts;
- an inventory of wells, pipelines (carrying liquids), and associated facilities;
- topographical maps showing designated spill control points (where applicable), access roads, urban centres, bodies of water and streams, information related to water supply intakes for municipal and industrial operations, pipelines, wells, and facilities within the operating area;
- roles, responsibilities, and expertise of company personnel to manage the response; the on-scene commander role can be filled with a designated company employee or a third party with appropriate expertise;
- policies for worker safety at an oil spill containment site;
- inventory and location of response equipment;
- containment and recovery procedures applicable to the type, volume, and nature of the production and time of year; and
- annual training and exercise programs, a record of the training and exercise, and recommendations for continuous improvement.

7.3 Spill Training Exercises and Notification Requirements

If not affiliated with a spill cooperative, a licensee must conduct its own exercise. It is up to the licensee to choose between conducting a deployment or a tabletop type of exercise.

Spill cooperative members operating wells, pipelines, or facilities must incorporate training exercises into their preparedness plans by

- being represented and participating at a minimum of one cooperative annual exercise in the area where its operations are located; attendance at an exercise held outside of the area in which the licensee operates facilities is considered satisfactory, provided that the administrator of the spill cooperative involved is notified for tracking purposes;
- having an area representative complete a recognized spill response course or on-scene commander course in lieu of attendance at a particular spill cooperative area exercise; or
- having an area representative complete a recognized spill response self-study course in lieu of exercise attendance (this option cannot be used for two consecutive years). If the option of taking a course in lieu of exercise attendance has been used, the cooperative administrators must be notified.

Notification of annual spill equipment deployment training exercises must be submitted in writing to the appropriate EUB Field Centre 30 days in advance of the exercise and include the following information:

- the type of training exercise to be conducted, the date on which it will be conducted, and the legal description of the land on which it will be conducted;
- a map showing the general topography and location of and the access routes to the deployment area and the location of any municipal water intakes within 3 km of the deployment area;
- the proposed spill material and volume to be used, if any;
- comments on the public use of the area, the collection and disposal of garbage, and a statement indicating the extent, if any, of anticipated surface disturbance to stream banks or shorelines at the test site; and
- the name of the landowner on whose land the training exercise will be held, and a statement indicating that the landowner has no objection to the exercise proceeding at the proposed test site.

Notification of annual spill equipment deployment training exercises must also meet the following criteria:

- If the exercise is to be held on Crown lands, a licensee must submit written notification to the appropriate Crown office (Public Lands or Forest Area) 30 days in advance of the exercise.[2] An access agreement must be in place for exercises that involve private lands.
- Any spill medium used must be edible canola oil or mineral oil, dyed with an innocuous dye that harms neither water quality nor flora and fauna.[3]
- A copy of the notification must be kept on site during the exercise.

7.4 Training Exercise Report Summaries

A copy of the training exercise report summary must be completed within 30 days following the training exercise. These reports must be available to the EUB upon request for a period of two years following each training exercise. A list of nonattending licensees must be forwarded to EUB Field Surveillance for enforcement.

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[2] Information regarding the appropriate Public Lands office or Forest Area office may be obtained from the Land Management Specialist, Resource Management and Coordination Centre, Forest Management Division of Alberta Environment at (780) 422-4871.

[3] A dye currently recognized as acceptable by the EUB is available through Western Canada Spill Services Ltd. (WCSS).

7.5 Higher-Risk Operations

Licensees that operate higher-risk facilities, such as

- pipelines (carrying liquids) crossing named water bodies or
- facilities, wells, or pipelines (carrying liquids) located within 100 m of a named water body or river valley break,

must evaluate the risk and ensure that they have response capabilities and expertise, in addition to membership in a spill equipment cooperative.

Examples of this heightened preparedness are frequent control point inspection, water flow monitoring, deployment exercise completion that incorporates these facilities, and ready access to additional spill containment equipment in conjunction with a high level of spill containment expertise.

At the request of the EUB, licensees with such operations must demonstrate that they are equipped to handle the increased potential for environmental damage from these types of facilities by providing evidence that the above items have been incorporated into their plans.

7.6 Enforcement

A licensee of wells, pipelines (carrying liquids), or facilities that does not have an approved spill contingency plan or a licensee that fails to maintain membership in good standing in a spill cooperative will be subject to Major enforcement action as detailed in *IL 99-4: EUB Enforcement Process, Generic Enforcement Ladder, and Field Surveillance Enforcement Ladder.*

EUB Field Surveillance will follow up with a licensee that has not met the attendance requirements stated in this guide. A licensee failing to meet the attendance requirements will be assessed a Minor enforcement action as per *IL 99-4*. A licensee that has higher-risk operations and has failed to incorporate the additional elements outlined in this guide will be subject to Minor enforcement action for noncompliance.

8 ERP Compliance and Enforcement Programs

8.1 Compliance Program Overview

The EUB uses a combination of ERP reviews, audits, and field inspections to ensure that licensees are compliant with the requirements detailed in this guide. The audit and inspection program objectives are to ensure that

- licensees have an ERP in place that meets *Guide 71* requirements;
- existing wells, pipelines, and facilities undergoing an ownership transfer have submitted a new ERP for EUB approval;
- ERP training test exercises are conducted in accordance with the requirements of this guide;
- licensee personnel and their contractors are trained and capable of responding to any emergency; and
- public and government notification and involvement are adequate.

8.2 Enforcement Policy Overview

The EUB's enforcement process is detailed in *IL 99-4: EUB Enforcement Process, Generic Enforcement Ladder and Field Surveillance Enforcement Ladder.*

Appendix 1 Repealed EUB Interim Directives (IDs) and Informational Letters (ILs)

The following EUB documents are rescinded in whole or in part as specified, as a result of the issuance of *Guide 71*:

ID-OG-76-2: Emergency Procedure Plans for Sour Gas Facilities

ID 90-1: Completion and Servicing of Sour Wells, Section 3—Emergency Response Plans

ID 91-2: Corporate-Level Emergency Response Plans

ID 97-6: Sour Well Licensing and Drilling Requirements, Section 3—Sour Well Emergency Response Plans

IL 87-8: Emergency Response Plans for Sour Gas Facilities

IL 88-17: Ignition Equipment for Drilling Critical Sour Wells

IL 89-15: Evacuation and Ignition for Sour Wells

IL 90-17: Emergency Procedure Plans for Sour Gas Facilities – Biennial Meetings

IL 99-1: Spill Equipment Deployment, Training Exercise Approvals and Report Summaries

Appendix 2 New Requirements in *Guide 71*

The table below provides an overview of the new requirements for emergency preparedness and response that are incorporated into this guide.

***Guide 71*: Summary of New Requirements**

Section 1: Introduction	• EUB has adopted the current edition of CSA Standard CAN/CSA Z-731. • A licensee must prepare ERPs for pipelines transporting HVP products and submit the ERP to the EUB for approval. • A licensee must prepare a specific ERP for hydrocarbon storage in caverns and submit the ERP to the EUB for approval.
Section 2: Initial Planning Requirements for Specific ERPs	• Public and local government involvement in emergency preparedness and response must take place after finalization of sale agreement and prior to the transfer from one licensee to another of wells, pipelines, and facilities requiring specific ERPs. • An H_2S release volume must be calculated for pipelines that transmit sour gas or sour multiphase product containing less than 10 moles of H_2S per kilomole of natural gas in order to determine the size of the EPZ. • An H_2S release rate assessment approved by the EUB Resource Application Group must accompany any request for a reduced EPZ.
Section 3: Corporate-Level ERPs	• Corporate-level ERPs must meet all the requirements specified in CAN/CSA Z-731 and other requirements in Section 3 of *Guide 71*. • Tables 2 and 3 are new approaches to classifying incidents and for possible responses to specified incidents.
Section 4: Sour Gas and Sour Multiphase ERPs	• A licensee is required to provide a copy of the ERP excluding confidential resident and personal information to any resident within the EPZ who requests one in writing. • All noncritical sour well ERPs must be submitted to the EUB in conjunction with the well licence application. • Supplemental information requirements are given for in-line testing using 21-day temporary surface pipelines. • Ignition requirements for uncontrolled flow of sour gas: ignition must occur within 15 minutes. • Estimated time for gas to surface is defined. • Any licensee of the gathering system associated with the facility must enter into a cooperative mutual aid agreement with the facility operator to ensure appropriate initial response. • Within 30 days of the end of an incident, a licensee must file with the EUB an operator incident summary report structured as outlined in Appendix 5. • Each licensee is required to notify the appropriate EUB Field Centre and the EUB Operations Group 30 days in advance of a scheduled exercise and invite representatives to participate or observe.
Section 5: High Vapour Pressure (HVP) Pipeline ERP Requirements	• As a minimum, an HVP pipeline must address all related requirements stated in CAN/CSA Z-731 and Sections 2 and 3 of this guide.
Section 6: ERP Requirements for Hydrocarbon Storage in Caverns	• The ERP must be custom designed for individual operations and address all related requirements outlined in CAN/CSA Z-731 and Sections 2 and 3 of this guide.
Section 7: Spill Response Contingency Plans	• Requirements are given for licensees with higher-risk operations.
Section 8: EUB Enforcement and Compliance Programs	• The EUB is developing a pilot audit program for the summer of 2003 based on the objectives in Section 8.

Appendix 3 Glossary

Air quality monitoring—measurement of atmospheric concentrations of a hazardous substance such as H_2S and SO_2.

Alert—immediate control of the hazard with progressive resolution of the situation.

Consequence Management Operations Centre (COMOC)—the provincial Consequence Management Operations Centre that will have the necessary personnel, expertise, communications, and facilities required for the coordination of a provincial response.

Critical sour well—an EUB designation of a well for drilling purposes that identifies a well with an H_2S release rate greater than 2.0 m^3/second or certain sour wells of a lesser release rate in close proximity to an urban centre as defined in *ID 97-6*.

Emergency—a present or imminent event outside the scope of normal operations that requires prompt coordination of resources to protect the health, safety, and welfare of people and to limit damage to property and the environment.

Emergency operations centre (EOC)—an operations centre established in a suitable location to manage the larger aspects of the emergency. In a high-impact emergency there may be a number of EOCs established to support the response. These may include corporate EOCs (regional, headquarters), a municipal EOC, a joint off-site regional EOC, and the provincial government COMOC.

Emergency planning zone (EPZ)—an area surrounding a facility, pipeline, or well where residents or other members of the public may be at highest risk during the early stages of an uncontrolled release of toxic materials such as H_2S or explosion or fire and the area for which the licensee must have a specific emergency response plan.

Emergency response plan (ERP)—a comprehensive plan to protect the public, including criteria for assessing an emergency situation and procedures for mobilizing response personnel and agencies and establishing communications and coordination, that is to be followed by all parties in the event of an incident.

Facility—any building, structure, installation, equipment, or appurtenance over which the EUB has jurisdiction and that is connected to or associated with the recovery, development, production, handling, processing, treatment, or disposal of hydrocarbon-based resources or any associated substances or wastes. This does not include wells or pipelines.

Fire Hazard Order (FH Order)—an order issued by the EUB during an emergency to restrict public access to a specified area.

Gathering system—the network of pipelines, pumps, tanks, and other equipment that carry oil and gas to a processing plant or to other separation equipment.

High vapour pressure (HVP) pipeline—a pipeline system containing hydrocarbon mixtures in the liquid or quasi-liquid state with a vapour pressure greater than 110 kPa absolute at 38°C. Some examples are liquid ethane, ethylene, propane, butanes, and pentanes plus.

Hydrogen sulphide (H_2S)—a naturally occurring gas found in a variety of geological formations and also formed by the natural decomposition of organic matter in the absence of oxygen. H_2S is colourless,

heavier than air, and extremely toxic. In small concentrations it has a rotten egg smell and causes eye and throat irritation.

Hypersusceptible—persons who may be abnormally reactive to a given exposure to toxins and whose reaction may occur in orders of magnitude greater than that of the susceptible population. Hypersusceptibles include those persons with impaired respiratory function, heart disease, liver disease, neurological disorders, eye disorders, severe anemia, and suppressed immunological function.

Incident—an unexpected occurrence or event that requires action by emergency personnel to prevent or minimize the impact on the safety and health of people and on property and the environment.

Level-1 emergency—immediate control of the hazard becomes progressively more complex because of deteriorating conditions.

Level-2 emergency—imminent and/or intermittent control of the hazard is possible.

Level-3 emergency—imminent control of the hazard is not possible.

Local authority

(i) council of a city, town, village, or municipal district;
(ii) in the case of an improvement district or special area, the Minister of Municipal Affairs;
(iii) the settlement council of a settlement under the Metis Settlements Act;
(iv) the band council of an Indian band if an agreement has been entered into with the Government of Canada in which it is agreed that the band council is a local authority for the purposes of the Disaster Services Act.

Lower explosive limit (LEL)—the lowest concentration of gas or vapour (per cent by volume in air) that burns or explodes if an ignition source is present at ambient temperatures.

Major (full-blown) exercise—as described in CAN/CSA-Z731, an exercise involving emergency response agencies, the licensee, and the deployment of all resources required to test the licensee's ERP and intended to provide a realistic simulation of an emergency response.

Mobile air quality monitoring—use of sophisticated portable equipment capable of tracking substances such as H_2S or SO_2 and of measuring very low (ppb) atmospheric concentrations.

Municipal emergency operations centre—the centre from which responsible municipal officials manage and support emergency operations within their jurisdiction, as well as formulate protective actions and provide public information. The centre has adequate workspace, maps, status boards, and communications capability.

Municipal emergency plan—the emergency plan of the local authority required under Section 8 of the Disaster Services Act.

Mutual aid—an agreement developed between two or more public and/or private facilities or operations to provide assistance to the parties of the agreement. Such an agreement is between two or more parties such as oil and gas companies, service companies, and local authorities.

On-site command post (OSCP)—an emergency operations centre established in the immediate vicinity of the incident to provide immediate and direct response to the emergency and initially staffed by company personnel.

Partially controlled flow—a restricted flow of product at surface that cannot be shut off at the licensee's discretion with equipment on site.

Public—the group of people who may be or are impacted by an emergency (e.g., employees, contractors, neighbours, emergency response organizations, regulatory agencies, the media, appointed or elected officials, visitors, customers, etc., as appropriate).

Publicly used facility—places where the presence of people can be anticipated. Examples include places of business, cottages, campgrounds, churches, and other locations created for use by the public.

Regional emergency operations centre (REOC)—an operations centre established in a suitable location off site near the emergency to manage the larger scale aspects of the emergency response and staffed jointly by government and industry personnel.

Residence—full-time or part-time dwelling.

Shelter—remaining indoors for short-term protection from exposure to toxic gas releases.

Sour gas—natural gas, including solution gas, containing H_2S.

Sour multiphase product—any liquid that contains H_2S in the gas phase.

Sour multiphase pipeline—a pipeline that transmits a multiphase product that contains more than 10 moles of H_2S per kilomole of natural gas in the gas phase.

Sour pipeline—a gas pipeline that transmits gas containing more than 10 moles of H_2S gas per kilomole of natural gas.

Sour production facility—any facility that processes sour gas.

Sour well—any oil or gas well expected to encounter sour gas-bearing formations during drilling or any oil or gas well capable of producing sour gas.

Special needs—those persons for whom early response actions must be taken for reasons such as requiring evacuation assistance, requesting early notification, not having telephones, requiring transportation assistance, or experiencing a language barrier.

Sulphur dioxide (SO_2)—a colourless, water-soluble, suffocating gas formed by burning sulphur in air; also used in the manufacture of sulphuric acid. SO_2 has a pungent smell similar to a burning match.

Surface development—occupied permanent or part-time dwellings, publicly used facilities including campgrounds, places of business, and any other surface development where the public may gather on a regular basis.

Susceptible—the subpopulation of persons who may be considered more sensitive to the effects of H_2S and SO_2, including the elderly, pregnant women, and the very young, particularly preschool-aged children.

Tabletop exercise—as described in CAN/CSA Z-731, an informal exercise generally used to review resource allocation, roles, and procedures and for orientation of new personnel to emergency operations without the stress and time constraints of a full-scale exercise.

Uncontrolled flow—a release of product that cannot be shut off at the licensee's discretion.

Upstream petroleum industry—constitutes all facilities, equipment, substances, and operations used in the exploration, recovery, processing, and transporting of petroleum within the Alberta Energy and Utilities Board (EUB) jurisdiction. Generally, this includes oil and gas operations upstream of a refinery and the storage and transportation of unrefined products by pipeline between oil and gas production facilities or other end points.

Urban centre—a city, town, village, summer village, hamlet with not less than 50 separate buildings, each of which must be an occupied dwelling; other incorporated centres; any similar development the EUB may designate as an urban centre.

Urban density development—any incorporated urban centre, unincorporated rural subdivision, or group of subdivisions with not less than 50 separate buildings, each of which must be an occupied dwelling; any other similar development the EUB may designate as an urban centre.

Appendix 4 EPZ Curves

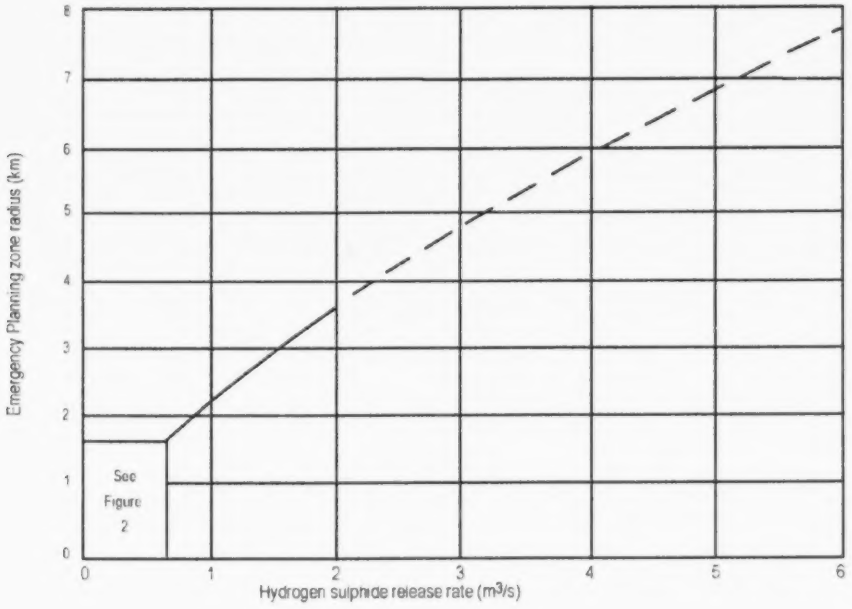

Figure 1 Emergency planning zones for wells

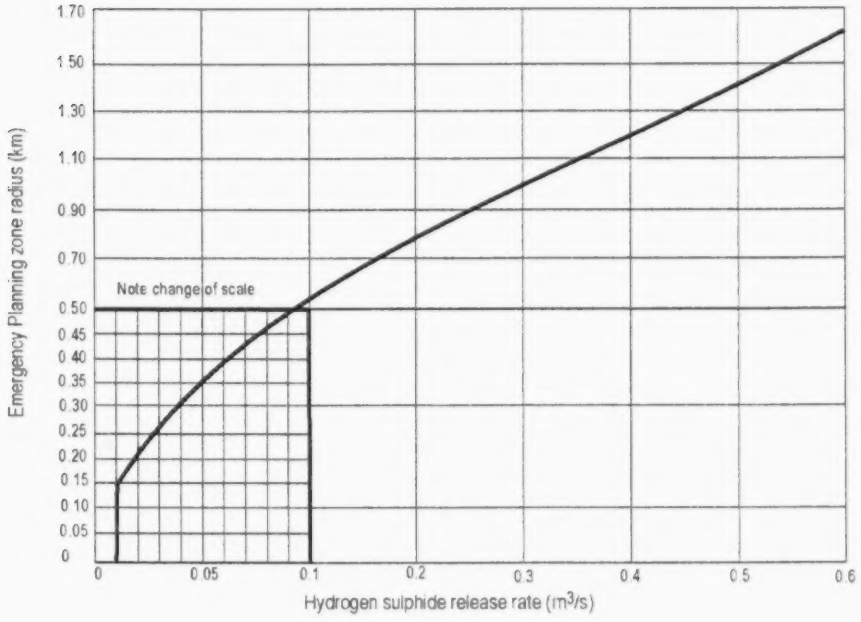

Figure 2 Emergency planning zones for wells

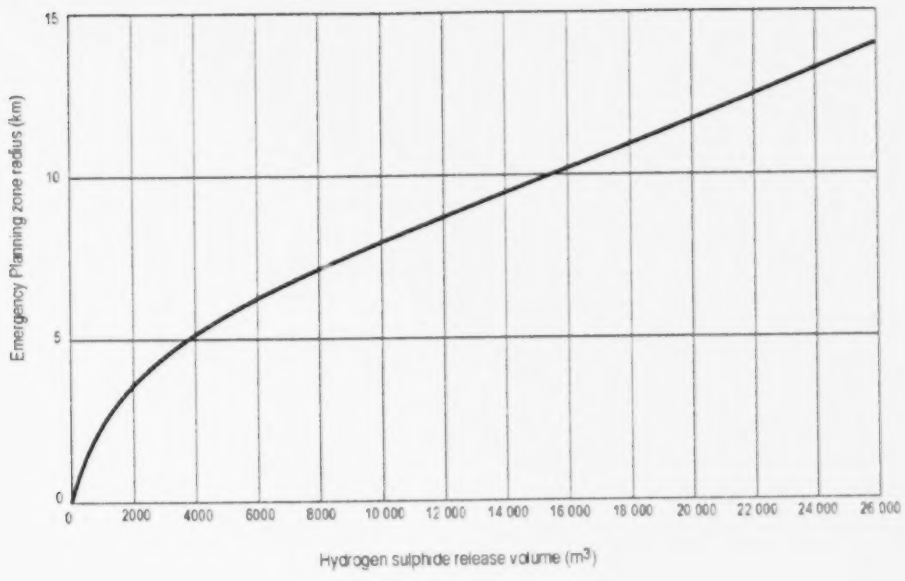

Figure 3 Emergency planning zones for sour gas plants, pipelines and production facilities

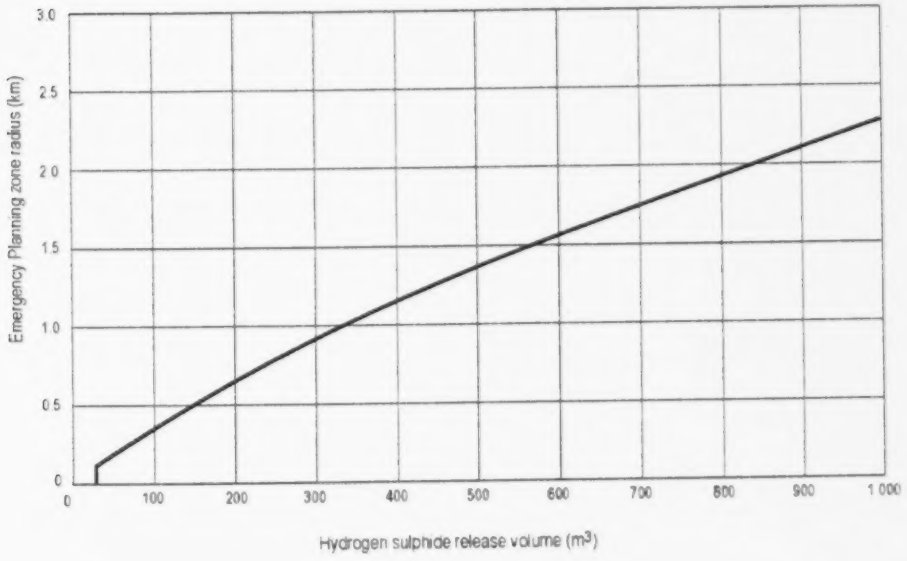

Figure 4 Emergency planning zones for sour gas plants, pipelines and production facilities (detail)

Pipeline H_2S Release Volume

The equation for calculating the maximum potential H_2S release volume from a pipeline is as follows:

$$V = \frac{2.232 \times 10^{-6} D^2 L (P+101.325) H}{Z (T+273)}$$

Where: V = maximum potential H_2S release volume in m^3
D = internal diameter of pipe in millimetres (mm)
L = length of pipeline between block valves (km)
P = licensed maximum operating pressure in kilopascals (kPa)
H = licensed H_2S content (moles/kilomole) for the pipeline
Z = compressibility factor at Pr and Tr
T = pipeline minimum operating temperature (°C)

Appendix 5 Operator Incident Summary

The Operator Incident Summary should be structured as indicated below, with the details outlined included as appropriate. The EUB requires two copies of the Operator Incident Summary. If the operator does not address all requested information, the team coordinator will request a revised report from the operator through written correspondence.

- **Contents**

- **Executive Summary**
  - Incident location; map of the area, including the unique well identifier, if applicable
  - Occurrence date and time
  - Duration of the incident
  - Contractor(s), if applicable
  - Summary of events
  - Estimated cost of the incident and control
  - Type and volume of lost production

- **Recommendations**
  - Actions to improve existing operations
  - Actions to prevent future occurrences
  - Actions to inform affected public of outcomes and findings

- **Background to the Incident**
  - Operator history in the area
  - Details of any previous nearby incidents
  - Summary and assessment of conditions and events immediately preceding the incident
  - Copy of the specific emergency response plan(s) if in effect or the corporate-level emergency response plan, with comment on how well the plan(s) worked or where improvements could be made

- **Description of the Incident**
  - Summary of the event
  - Details of internal and external notification
  - Response and control measures
  - Details of any monitoring programs (air, water, soils), including their results
  - Security and safety measures for the site and potentially affected area
  - Use of contractors
  - Communications program and media involvement, including an assessment of their effectiveness, what worked well, and where improvements can be made
  - Actual or suspected cause, the rationale used to determine the cause, and if applicable, the progression from a kick to a blow to a blowout

- **A copy of the drilling plan**, if applicable, including an **overview of geology** relative to the well in question. Also required is a **summary sheet of well data**, such as
  - the STICK diagram
  - mud weight at the time of incident
  - formation name, depth, and pressure
  - H_2S content

- reservoir releases (gas, oil, condensate, water) and flow rates
- initial release point at surface
- release geometry (horizontal, vertical, diffused, etc.)
- restricted (valve partially closed, etc.) or unrestricted flow
- details of any relief wells
- list of equipment losses

- **Description of all potential impacts and steps taken during the incident** to monitor and minimize the effects on
  - public
  - workers
  - environment
  - animals (domestic and wildlife)

- **A copy of or sufficient detail respecting appropriate maintenance and operating programs** related to the incident (e.g., SCADA systems, pipeline corrosion program, ESD valve operating conditions and maintenance programs, tour reports, drilling recorder and mud volume information, blowout preventer test and inspection report, employee certifications)

- **All third-party analyses of any pipeline or equipment failures** (e.g., metallurgical reports), if applicable

- **Copy of personnel statements**, if available

- **Conclusions respecting the incident**, with emphasis on
  - how the knowledge gained from this incident will be shared with other operators
  - timeline to implement actions, including measurement points that will be used to ensure actions are followed up, resulting in lasting improvement

The information contained in your report may be the subject of a request for information pursuant to the Freedom of Information and Protection of Privacy Act (FOIP). Please identify those portions of your report that you believe contain confidential information and explain, within the report, why you believe the information to be confidential.

Appendix 6 Government Agencies

Specific ERP plans must be distributed to government departments and agencies in Alberta as follows:

1) **Alberta Energy and Utilities Board (EUB) (2 copies): Upon approval, licensees must ensure that the EUB Operations Group has both copies of the ERP.**
Note that only the EUB copies should contain confidential resident information.

Alberta Energy and Utilities Board
Operations Group
640-5 Avenue SW
Calgary AB T2P 3G4

2) **Emergency Management Alberta (1copy)**
The Edmonton office records information in its database and then forwards the ERP to the appropriate district office.

Emergency Management Alberta
16th Floor, Commerce Place
10155-102 Street
Edmonton AB T5J 4L4

3) **Municipal government (includes city, town, village, summer village, municipal district, county, special area, national park/ID, Indian reserve, and Metis settlement) (1 copy)**
Determine appropriate jurisdiction. An ERP is only sent to a town or city if its boundary falls into the EPZ or is in very close proximity (for example, 1 km beyond the EPZ). If this is not the case, the ERP should be sent to the appropriate municipal district or county.

4) **Royal Canadian Mounted Police (RCMP) or local police department (1 copy)**
Determine appropriate jurisdiction.

5) **Regional health authority (1 copy)**
Determine appropriate jurisdiction. The ERP should be forwarded to the appropriate regional health authority, directed to the Manager/Director of Environmental Health.

6) **Alberta Human Resources and Employment, Workplace Health & Safety Compliance (1 copy)**
A copy should be sent to either the Northern or Southern Regional Office to the attention of the Team Leader:

Team Leader
Alberta Human Resources and Employment
Workplace Health & Safety Compliance
Southern Regional Office
600, 272 - 7 Avenue SW
Calgary AB T2P 0Z5

or

Team Leader
Alberta Human Resources & Employment
Workplace Health & Safety Compliance
Northern Regional Office
10th Floor, South Tower
7th Street Plaza
10030-107 Street
Edmonton AB T5K 2N2

7) **Alberta Sustainable Resource Development (1 or 2 copies)**
For reasons of regional jurisdictional divisions between the Public Lands Branch (PLB) and the Forestry Lands Branch (FLB), the province is divided into white (urban-PLB) and green (forested-FLB). In some areas there may be overlap between the jurisdictional boundaries of these branches. One (and in some cases both) of these regional branches of Alberta Sustainable Resource Development should receive a copy of the ERP. Each branch should be contacted to confirm if it requires a copy.